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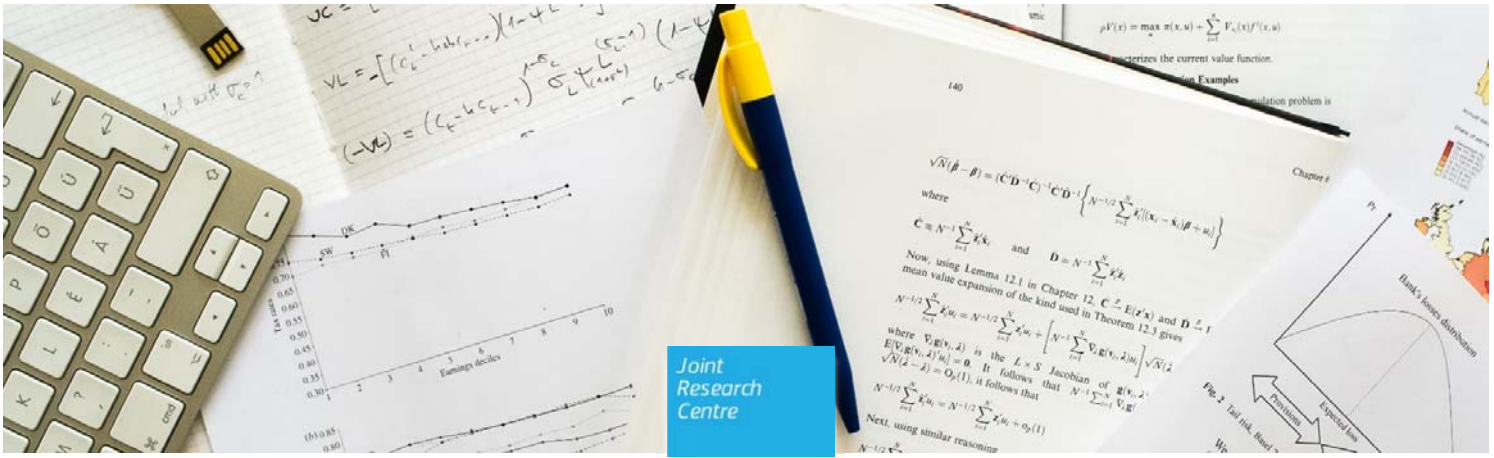

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Has the *Grexit* news affected euro area financial markets?(*)

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Abstract

This paper investigates whether rumours about Greek exit from the euro area have spilled over into other European countries' sovereign bond yields. Our empirical analysis is based on more than 64,000 daily news items on *Grexit* between December 2014 and October 2015. We build a *Grexit intensity* index based on the daily change of *Grexit* news items to capture policy uncertainty about the euro area break-up. Our results suggest that higher intensity of *Grexit* news drives up government bond yields in peripheral countries (Italy, Portugal, and Spain, excluding Ireland), but that there are no effects on core countries. The asymmetric reaction to *Grexit* news seems to support a more general 'market-based fiscal disciplining' mechanism at work in monetary unions.

Keywords: *Grexit*, financial markets, government bond, news, euro area, GARCH.

JEL classification: E43, E62, G12, G14

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1. Introduction

"A full exit looks bad enough for both Greece and the rest of the euro area that the search is on for alternatives"

The Economist, 11 July 2015

The concept of *Grexit* became popular in December, 2014 when the Greek Parliament failed to elect a new president, leading to Parliament's dissolution and the announcement of new elections in January 2015. In the aftermath of the elections, the possibility of Greece's exit from the euro area began to solidify in popular imagination and become viewed as a likely outcome and, even, as an extreme remedy to the ongoing crisis.

In June 2015 Prime Minister Tsipras announced a national referendum that would be held to accept or reject the bailout conditions proposed by the so-called "Troika": the European Commission (EC), the International Monetary Fund (IMF) and the European Central Bank (ECB). The referendum was interpreted as a choice for Greece between remaining in the euro area and leaving it, making euro area break-up a plausible scenario.[1] As a consequence, the *sentix Euro Break-up Index* jumped considerably in 2015, immediately after the Tsipras' call for "the referendum against austerity" as recently documented by Lops (Il Sole 24 Ore, 9 February 2017).

The bailout referendum announcement gave rise to an increase in worldwide media news in using the word *Grexit*. This spread of *Grexit* news possibly favoured a widespread anxiety, not limited to Greece, which had an impact on traders and investors' decision being also based on such news and announcements. As shown in Figure 1, rumours about *Grexit* rose along with the 10-year sovereign bond yields of both core and peripheral European countries.

[1] Germany's Vice-Chancellor, Sigmar Gabriel, affirmed that if the Greeks voted no on 25 June, they would be voting "against remaining in the euro". Moreover, Hollande declared that: "It's the Greek people's right to say what they want their future to be. It's about whether the Greeks want to stay in the eurozone or take the risk of leaving". Finally, Jean-Claude Juncker, President of the European Union, said: "It's the moment of truth [...] I'd like to ask the Greek people to vote yes [...] No would mean that Greece is saying no to Europe" (The Guardian, 30 June 2015).

[Insert Figure 1]

On 5 July, 2015, the bailout conditions were rejected by the majority of the Greek people and a period of clashes within the government parties resulted in a cabinet reshuffle in the same month, and new elections in September.

In light of such events, our paper tries to fil this gap by checking the effect of *Grexit* news diffusion on financial markets of other euro area countries. An important role in this story is played by the volume of publicly accessible news related to *Grexit*. Intuitively, considering that financial markets had been aware of a possible Greek exit and, consequently, of a euro area break-up since (at least) the end of 2014, increases in the press coverage on this topic could fuel their concerns about an event with unpredictable outcomes for the whole euro area and its future. For this reason, we build a *Grexit intensity* index based on the daily change of *Grexit* news items reflecting the frequency of news and articles in the global press that contain the word "Grexit" in line with the Baker et al. (2016) approach. We focus on Ireland, Italy, Portugal and Spain, so-called peripheral countries; Belgium, France, Finland, Germany and the Netherlands, so-called core countries.[2] We take advantage of Factiva database by collecting more than 64,000 news on *Grexit* published daily from 1 December, 2014 to 31 October, 2015.

Our paper builds on a well-established empirical literature, which analyses the reactions of financial markets to macroeconomic, fiscal and monetary policy announcements (e.g., Born et al., 2014; Falagiarda and Gregori, 2015; Hayo and Neuenkirch, 2015; Dräger et al., 2016). Within this literature, we are close to studies that focus on the impact of news and communications on sovereign bond yields in the context of the euro area debt crisis (e.g., Arru et al., 2013; Beetsma et al., 2013;

[2] A similar approach has been adopted by Beetsma et al. (2013) who focus on the so-called GIIPS countries and other European countries to investigate how "news" affected domestic interest spreads vis-à-vis Germany and how it propagated to other countries during the recent crisis period. More recently, Caporale et al. (2014) consider eight countries belonging to the euro area (Belgium, France, Germany, Greece, Ireland, Italy, Portugal and Spain), distinguishing between core and peripheral countries – the latter represented by the GIIPS in their paper – to analyze the effects of newspaper coverage of macro news on stock returns of such countries.

Mohl and Sondermann, 2013; Gade et al., 2013; Altavilla et al., 2014; Caporale et al., 2014; Saka et al., 2015; Bouzgarrou and Chebbi, 2015).

Our study is also in line with contributions investigating the contagion effect from Greece to other euro area countries during the sovereign debt crisis. For example, Mink and de Haan (2013) use news reports on a Greek bailout to analyse their impact on bank stock prices in 2010 for 48 European banks. They find that news about a Greek bailout did not lead to abnormal returns, even for banks with no exposure to Greece or other highly indebted euro countries. Bhanot et al. (2014) show that increases in Greek yield spreads are associated with negative abnormal returns on financial stocks, in Portugal, Spain and the Netherlands between 2005 and 2011. More recently, Haupenthal and Neuenkirch (2017) analyse the impact of political communications on Grexit by European leaders on stock returns in Greece and other euro area countries using intraday data in 2015. They show that the Greek stock index reacts much more strongly to Grexit news than the German or the euro area index.

Finally, our paper is related also to the strand of literature investigating the role of the media in influencing financial markets. Some studies document a significant correlation between media and financial market activity (Klibanoff et al., 1998; Engelberg and Parsons, 2011; Peress, 2014) and propose investor psychology to explain the relationship between news and financial markets (Tetlock, 2007).

Compared to the previous literature, our paper is the first to check for European financial markets' reactions to a specific negative news content, such as the term "Grexit" would invoke around the world since the announcement of the Greek parliamentary elections in late 2014.[3] More importantly, our approach aims to define a measure of policy uncertainty about the euro area break-up through the *Grexit intensity* index and its relationship to European core and peripheral government bond yields, under financial markets and investors' scrutiny especially during the

[3] Some studies attempted to identify the specific news events in one country that affect other countries; however, they tended to focus on Asian countries during the Asian crisis (e.g., Kaminsky and Schmukler, 1999; Baig and Goldfajn, 1999).

observed period.

Our main results indicate that increased intensity about news on a possible Greek exit from the euro area drove up the government bond yields in the peripheral countries of Italy, Portugal, and Spain, but excluding Ireland. By contrast, no effects emerge in the European core countries in our sample. This would suggest that rumours about *Grexit* has spilled over, but only into countries which were thought to share similar underlying weaknesses to Greece during the observed period. Indeed, general government consolidated gross debt (% of GDP) for 2015 shows the highest levels for Italy, Portugal and Spain, following the Greek value of 176.9% (from the latest update of the EC database on 3 May, 2016). On the other hand, in Ireland the debt-to-GDP ratio was 93.8% in 2015 and was coupled with a GDP growth rate of over 7.5% in that same year.[4]

In this perspective, our evidence of such asymmetric reaction of financial markets seems to support a more general 'market-based fiscal disciplining' mechanism at work in a monetary union:[5] financial markets, that react to *Grexit* news as a potential euro area break-up in our case, are likely to ask higher government risk premia from countries presenting public finance troubles such as our peripheral nations.

Our main results are confirmed when: i) we consider the single country's exposure to Greek public debt; ii) we split the *Grexit intensity* index before and after the Greek bailout referendum; iii) we distinguish for positive and negative variations of the *Grexit intensity* index. Finally, we provide new insights through a refined analysis which focuses on association of *Grexit intensity* index with supranational institutions and political bodies. Interestingly, we find that an increase in the *Grexit intensity* index associated with technical institutions (e.g., the ECB) exert a more relevant

[4] Both these outcomes, combined with a decrease in the unemployment rate (less than 10% in 2015), were an inevitable consequence of structural reforms and determined policy efforts in Ireland which began in 2010 - when Ireland could no longer be self-financed from national resources - with the international bailout measures. The objectives of these policies included restoring the banking sector and implementing fiscal adjustment to relaunch fiscal sustainability and growth-enhancing reforms. As intended, Ireland had completed the program by the end of 2013.

[5] For the US, see e.g., Goldstein and Woglom (1991) and Bayoumi et al. (1995); for European Monetary Union (EMU), see Schuknecht et al. (2009), De Grauwe and Ji (2013, 2014). More generally, a large part of the recent literature recognizes an adverse role of fiscal variables (i.e. public deficits and debt) on the rise of government bond yields for South euro area countries during and after the 2007–2009 financial crisis (von Hagen et al., 2011; Aizenman et al., 2013).

influence with respect to that of political bodies (e.g., the European Council) for government bond yields in peripheral countries. This might be explained by higher perceived legitimacy and a stronger commitment of the former with respect to the latter for the financial markets perspective.

The rest of the paper is structured as follows. Section 2 describes the data and the empirical model. Section 3 presents the main results using the *Grexit intensity* index. Section 4 provides additional results from disaggregating *Grexit* news by different sources such as supranational institutions and politics. Section 5 concludes.

2. The empirical analysis

2.1 Data and main variables

We exploit the Factiva database (owned by Dow Jones & Co.), which provides and aggregates content from more than 36,000 sources (both licensed and free) from 200 countries in 28 languages. The database carries a broad range of content and provides both local insights and global perspectives on business issues and current events, with a specific focus on current information on companies, industries and financial markets. This wide ranging information is drawn from sources such as newspapers, newswires, industry publications, and company reports.

We searched for news containing the word "Grexit", which is an internationally recognized expression that describes Greece's potential withdrawal from the euro area, also allowing cross-country media comparability. In doing so, we follow a rapidly growing literature on text search methods using, in particular, newspaper archives to proxy for economic and policy conditions and measure a variety of outcomes (see Boudoukh et al. 2013; Alexopoulos and Cohen 2015; Baker et al. 2016). The intensive debate on the possibility of a Greek exit in the press contributed to generate fear and tension in the financial markets. Accordingly, we are interested in the number of news items in order to capture the intensity of the *Grexit* "concern" and test whether – and how – variations in the amount of such news would affect the stability of European financial markets.

On average, we count more than 250 news items per diem that included the word *Grexit,* and more than 64,000 during the whole period 1 December, 2014 – 31 October, 2015. It is straightforward that the number of daily *Grexit* news items before and after this period was close to zero. This brings us to focus on this precise time span for the scope of our research question.

To capture how financial markets react to *Grexit* news, we use the daily change in 10-year government bond yields as the dependent variable. The choice of government bond yields, instead of government spreads, is preferable to better focus on country specific issues. Indeed, if government spreads would be considered, a benchmark country is needed and movements in its bond yields could affect the final outcome (Dunne et al., 2002). More generally, investors look at their own sovereign bond yields as well as at those in other euro area countries to infer country's financial health and fiscal sustainability.

2.2 Model identification

Since government bond yields exhibit time-varying volatility, a model able to deal with the presence of autoregressive conditional heteroscedasticity disturbances is recommended. We implement the standard Generalised Autoregressive Conditional Heteroskedastic model, GARCH(1,1),[6] originally proposed by Bollerslev (1986) as a generalization of the ARCH (Engle, 1982) in order to order to model in a parsimonious way the conditional heteroskedasticity, which fits well the conditional variance of bond yields (see, among others, Kim at al., 2004; Bhanot et al., 2014 for similar applications). The conditional mean of the model is an augmented autoregressive process:

$$\Delta B_t^i = \alpha^i + \beta^i \Delta B_{t-1}^i + \gamma^i Grexit\ intensity_t + \\ + \delta^i ECB\ NSMP_t + \boldsymbol{\eta^i X_t} + \boldsymbol{\varphi^i W_t^i} + \epsilon_t^i \quad (1)$$

[6] We have tested different specifications of the GARCH, but considering that (i) there is not a clear evidence of the fact that the GARCH(1,1) is outperformed by more sophisticate models (Hansen and Lunde, 2005), and (ii) the estimates of the conditional variance are positive and significant, we implemented the most parsimonious specification, i.e. GARCH(1,1).

where the error term follows a Student-t distribution,[7] and its conditional variance is modelled as an ARMA(1,1) process for each country (we omit the superscript *i* to simplify notation):

$$\sigma_t^2 = \delta + a\epsilon_{t-1}^2 + b\sigma_{t-1}^2 \quad (2)$$

ΔB_t^i is the daily change in the of end-of-day sovereign bond yields for country i; ΔB_{t-1}^i is the lagged dependent variable, added to remove autocorrelation;[8] $Grexit\ intensity_t$ is an index based on the daily change in the number of *Grexit* news items in the global press. This setting allows to study each country individually on the basis of different coefficients of the independent variables across countries (Favero et al., 2010; Favero and Missale, 2012).[9] Accordingly, we perform different regressions by each single country.

Among the controls, $ECB\ NSMP_t$ stands for the ECB non-standard monetary policy news (taking advantage of Falagiarda et al. 2015). This variable is included also to control, on top of the conventional transmission channels of ECB monetary policy, for the weakness in the EMU during the observed period. The rationale for using such non-standard measures is generally that central bank conventional tools (i.e. interest rates and monetary aggregates) became less effective and not fully able to affect economic activity in the desired direction (see Wyplosz and Panizza 2016 for a detailed discussion). In this case, unconventional monetary policy announcements are likely to be interpreted as a signal of a general fragility of the euro area. Thus, they should be taken into account beyond idiosyncratic cases of vulnerability. $\boldsymbol{X_t}$ is a vector of the common controls for all countries

[7] The Student t distribution has been proven to outperform the normal distribution assumption, considering that the former is able to better model the distribution over time of speculative price changes and rates of return (Bollerslev, 1986).

[8] To this purpose, we applied the portmanteau test for white noise (Box and Pierce, 1970) and cannot reject the null hypothesis of independently distributed residuals. Hence, the residuals are independently distributed. In addition, based on the lagged dependent variable, we take account of all the information (e.g., including that relating to the possible indirect effects of group membership, say the effects of other peripheral countries on Italy) up to the period *t-1*, which might affect the dependent variable.

[9] By allowing the coefficients of all the variables to be country-specific, we avoid pooled data which force the coefficients of the independent variables to be identical across countries.

and is composed of two indicators: (i) the European volatility index (VSTOXX) to control for financial turmoil (see also Arghyrou and Kontonikas, 2012; Glick and Leduc, 2012) and, more generally, for the level of uncertainty in the economy (Foerster, 2014); (ii) a risk aversion indicator, calculated as the difference between US AAA corporate bond yields and US 10-year government bond yields to account for global risks and to explain crises in financial markets (Codogno et al., 2003; Coudert and Gex, 2008; Favero et al., 2010).[10]

Finally, we introduce additional country-specific control variables stemming from releases of news macroeconomic data, $\boldsymbol{W_t^i}$, which might have affected our dependent variables (see Altavilla et al., 2014). These data on macroeconomic releases were collected from Bloomberg and consist of day before market participants' expectations about all the available macroeconomic variables in their respective countries. The expected values are constructed as the median of all forecasts collected up to one day before the release of the official data. The series are standardized. They can be considered a measure of the specific surprise content in the most relevant macroeconomic data releases, for each country in our sample. This procedure allows us to control for possible movements in our dependent variables due to unexpected changes in the macroeconomic variables other than *Grexit* news. Table 1 presents definitions and descriptive statistics of all variables.

[Insert Table 1]

It should be noted that there might be potential issues of reverse causality between the frequency of *Grexit* news items and sovereign bond yields in the European countries in our sample. To deal with this, we implemented a standard check in the time series analysis (see Hamilton 1994), in line with Gade et al. (2013), by running Granger causality tests for each country separately. Specifically, we implemented the test regression by investigating whether the lagged values (up to 4) of the daily

[10] Our results are not affected by multicollinearity issues between our main explanatory variable and the controls since we found no troubling correlations among the regressors at the 1% level of statistical significance (i.e. the highest value is about 0.24).

end-of-day change of bond yields helped to forecast the daily change in the number of items of *Grexit* news, by controlling for other exogenous variables and also for the lags of the dependent variable. We found no evidence of Granger causality in our dependent variables for the *Grexit intensity* index. These results are consistent with the idea that end-of-day sovereign bond yields in euro area countries do not influence the discussion of potential *Grexit* on the same day.

For completeness, we applied the Granger test to Greece and found that endogeneity cannot be ruled out in that case. Therefore, the direction of causality between Greek bond yields and our *Grexit intensity* index is questionable for Greece. For this reason, and given our interest in capturing the potential rumours from such news outside Greece, we exclude Greek bond yields (as the dependent variable) from the analysis.

3. Main results and discussion

Our empirical analysis provides novel results supporting evidence that the risk of a euro area break-up event related to *Grexit* rumours spilled over to other European countries during the observed period. There are relevant differences across core and peripheral countries as shown in Table 2 (where each column represents a single country regression).

Specifically, we are interested in the coefficients on the *Grexit intensity* index. The sign of these coefficients is positive (and statistically significant) for Italy, Portugal and Spain, meaning that a daily increase in *Grexit* news items leads to an increase in government bond yields of such countries. In terms of magnitude, a 1 point increase in the *Grexit intensity* index determines an increase in, for instance, Italian bond yields by 11 daily basis points.[11] Higher values are experienced by Portugal (15 daily basis points) and Spain (27 daily basis points) for the same

[11] A 1 point increase of the index corresponds to a 100 *Grexit* news increase. We calculated the elasticity by multiplying the estimated coefficient on the *Grexit intensity* index by the ratio between the average values of the explanatory variable and the dependent variable for Italy in this case The same procedure is applied to other single country for statistically significant coefficients on the *Grexit intensity* index.

increase in the *Grexit intensity* index. As might be expected, Southern European countries have been recently subject to more scrutiny by the financial markets because of their greater vulnerability concerning domestic public finances, which also would question their financial stability. All these problems seem to be amplified by the financial turbulence induced by *Grexit* news diffusion and the way that investors perceived the situations of peripheral countries when media coverage of *Grexit* increased around the world.

[Insert Table 2]

The picture is very different for core countries in Table 2, where we observe no statistically significant effects due to *Grexit* news variation, revealing a lower sensitivity of financial markets to such debate for these countries. The improved fiscal position and the decline in public debt in the case of Ireland in 2015 could explain why this country was less vulnerable to negative shocks, such as *Grexit* news, and was not affected heavily by euro area break-up risk. As well-documented by Whelan (2014), after the EU-IMF agreement, market sentiment towards Irish debt worsened also in combination with the Greek situation heading towards a sovereign default. Investors were worried that Ireland would be among the other countries that would subsequently default. Actually, this was not the case and Ireland's success story – among the European high-debt countries – leads to a gradual improvement in market sentiment towards the country's debt.

Overall, these results reveal investor's fears on the structural integrity of the euro area and how "investors' fears about this weak structure have manifested themselves by attacking the euro through the government debt market" (Alessandrini et al. 2014, p. 6), again stressing the weakness of Southern with respect to Northern countries (see also Caporale et al. 2014).

Among the controls, the ECB non-standard monetary policy news (*ECB NSMP* in Table 2) has an interesting effect. Although these actions were justified on the basis of adverse events within the

euro area,[12] the effect of their announcement appears to be the same for core and peripheral countries. Specifically, the variable *ECB NSMP* has a negative and statistically significant coefficient across specifications. Thus, ECB non-standard monetary policy news generates a decrease in the changes in government bonds for both groups of countries.

In relation to core countries, this would suggest that unconventional monetary policy announcements may be beneficial even for less troubled economies, generally characterized by a better fiscal position with respect to peripheral countries. To the extent that such announcements are, reasonably, perceived as alternative strategies pursued by the ECB to improve unfavourable financial conditions for certain countries in the euro area, a sort of "self-fulfilling market sentiment" may prevail in the markets (De Grauwe, 2013; De Grauwe and Ji, 2013; 2014). As a consequence, more trusted countries – such as the core ones – would become the recipients of new liquidity inflows and a sort of refuge-haven asset for investors starting to look for safer places to invest, according to the "preferred habitat theory" (Hamilton and Wu, 2012). Ultimately, this would lower the interest rates and boost the economies of such countries.

Some previous works (e.g., Szczerbowicz, 2015, Falagiarda and Reitz, 2015) suggest that periphery euro area countries are supposed to benefit most from such non-standard monetary policy. This seems to be confirmed by our results on Italy, Portugal and Spain even at a lower statistically significance level. This could be explained by the fact that, in our period of analysis, ECB non-standard monetary policy news related mainly to Quantitative Easing (QE) whose announcement and effective beginning (respectively, on 22 January and 9 March 2015) seem to have had a softer effect on government bond yields in peripheral countries compared to what happened immediately after the Draghi's July 2012 "whatever it takes" speech, when periphery bond yields fell significantly (see Demertzis and Wolff, 2016).

For the European VIX (*EuroVix* in Table 2), it affects peripheral and core countries differently.

[12] For example, in January 2015, the expanded Asset Purchase Program (APP) was announced, which adds a purchase programme for public sector securities (PSPP) to the existing private sector asset purchase programmes, to address the risks of an overly prolonged period of low inflation.

In detail, bond yields in the former group increase in the presence of financial turmoil, while they decrease in the latter group. Overall, this finding for *EuroVix* might stress a flight-to-quality effect, considering the better credit ratings of the core compared to the periphery countries. This effect was confirmed in the document presented to the European Parliament (2016) by its Directorate-General for Internal Policies of the Union, according to which banks in the core countries are buying bonds from their own governments, while banks in the periphery zone acquire bonds also from the governments of core countries.

Finally, all the results in Table 2 were checked adding up to seven lags of the dependent variables among the regressors to control further for autocorrelation. They are confirmed.

3.1 The role of Greek public debt

One concern about the results of core *versus* peripheral countries in our sample may be the role of individual country's exposure to Greek public debt. Put differently, a country's high exposure to Greek public debt might drive our results. We check for this possibility by including on the right-hand side of equation (1) the share of Greek debt owned in 2015 by each country.[13] The main results (not reported here; available upon request) are confirmed for both core and peripheral countries, i.e. the effect of *Grexit intensity* index is positive and statistically significant only for the latter. The lack of connection between *Grexit* news and core countries' bond yields reveals a lower sensitivity of their financial markets to variation in such news even in presence of some exposure to Greek debt. Indeed, during the observed period Germany and France showed the highest shares of such debt (BBC, 10 July 2015, "The Greek debt crisis story in numbers").[14] However, this did not call for anxiety in financial markets of those countries when the amount of *Grexit* news increased. The

[13] We weighted this share by the daily Greek government bond yields to take into account the Greece country risk beyond the simple share of Greek owned debt. We exploited various sources such as the Bank for International Settlements (BIS), IMF, ECB and Datastream databases.

[14] Beyond a country-specific exposure, the Greek debt was also shared among EU countries via the European Financial Stability Fund (EFSF), whose mission is to safeguard financial stability in Europe by providing financial assistance to countries of the euro area. In this perspective, the Greek default risk was somehow covered by both core and other peripheral countries (e.g., Italy) with such mechanism. The contribution of each country to the EU bailout loans was different but it basically reveals a common attitude across such countries.

opposite feeling occurred for peripheral countries, even in presence of a lower exposure to Greek public debt, so ruling out the Greek debt channel in explaining our main results.

3.2 The Greek bailout referendum

As the clearest warning for the potential euro area break-up was the Greek bailout referendum (i.e. 5 July, 2015), we run regressions by identifying *Grexit* news variation before and after the referendum day to capture potential heterogeneity of the *Grexit intensity* index due to this event. In such a way, we test whether the effect of *Grexit* news on government bond yields in the euro area is different in the two sub-periods. Operationally, we include a news index for each sub-period in equation (1), namely *Grexit intensity PRE* index for the pre-referendum days (i.e. from December 2014 to 5 July 2015) and *Grexit intensity POST* index for the post-referendum days (i.e. from 6 July 2015 to October 2015). Each index is built following the logic described in Section 2.

Results are reported in Table 3 (where each column represents a country regression). It is easy to note that they are consistent with those in Table 2 with reference to the picture for peripheral *versus* core countries. Indeed, both *Grexit intensity* indexes are not statistically significant in columns from (5) to (9), say for core countries. More interestingly, different effects of *Grexit* news items pre- and post-referendum emerge in the case of peripheral countries (excluding Ireland, as in Table 2). In detail, only the coefficients on *Grexit intensity PRE* index are statistically significant and positive for Italy, Portugal and Spain specifications. This suggests that their government bond yields increased due to increased intensity of *Grexit* news before the Greek national referendum.

[Insert Table 3]

On the other hand, no effects arise in the case of the *Grexit intensity POST* index. This finding is not surprising. In fact, after the referendum the Greek exit event was not realized, although the referendum outcome rejected the bailout conditions thus suggesting a real possibility that Greece

would leave the euro area. Since this actually did not happen, intuitively the financial markets were relieved and recognized that a Greek exit scenario became unrealistic. As a consequence, no relevant variation is observed in government bond yields of peripheral countries (as happened for the core ones). As highlighted by Figure 1, in the period from July to December both the movement in government bond yields and the number of *Grexit* news items diminished considerably with respect to the pre-referendum period. Therefore, the lower variation in both such variables could make it more difficult to detect any statistically significant relationship between the two phenomena.

3.3 Grexit news: positive and negative variations

To check whether the sign of the *Grexit intensity* index does matter and differently affects government bond yields of our countries, we estimate the model distinguishing positive (i.e. *Grexit intensity POS*) and negative (*Grexit intensity NEG*) values of our *Grexit intensity* indicator. We include both variables in equation (1) and provide results for peripheral and core countries in Table 4.

The main findings are confirmed. Indeed, neither positive nor negative variations in the *Grexit intensity* index affect core countries' sovereign bond yields. Thus, the split into positive and negative values of the index does not matter for them, as both *Grexit intensity POS* and *Grexit intensity NEG* are never statistically significant in columns from (5) to (9).

[Insert Table 4]

On the other hand, statistically significant coefficients are found in the case of peripheral countries (excluding Ireland, as before). This holds for the *Grexit intensity POS* index only, with the expected sign, contributing to corroborate our baseline results: increased anxiety due to increased intensity of *Grexit news* in the global press calls for increased government bond yields of

more vulnerable countries only. Even with the expected negative sign, the coefficients on *Grexit intensity NEG* are never statistically significant in columns (2)-(4). Therefore, negative variations in the *Grexit intensity* index calls for negative variations in government bond yields but such relationship is not robust. Possibly, markets are not relieved by such negative variations, being the risk of a euro area break-up still plausible.

3.4 Grexit news by country press

Due to cross-country media comparability, the word "Grexit" have been extensively used even outside Greece. For example, in May 2015 the term "Grexit" appeared 27 times in *Kathimerini* newspaper, which is one of the Greek English language media compared to 39 and 31 times, respectively, in the *Handelsblatt* (German daily business newspaper) and in the UK *Financial Times*. This would suggest that continental newspapers were also focused on the subject, contributing to animate discussion on *Grexit* around the world.

Given this, we provided a further exercise where we exploited the richness of the dataset and refined the analysis by distinguishing *Grexit* news by single country press. In detail, the variable *Grexit intensity* in the model is replaced by news on a Greek exit in the press of some core, peripheral and other countries in Europe (used one at a time): French and German; Spanish and Italian; British and "Other EA"[15]. The Grexit *intensity* index computed by single country press enters one at a time in equation (1) and captures the possible rumours due to *Grexit* from one country – other than Greece – to other countries during the observed period.[16]

Table 5 reports the results where each table cell represents a single regression, which is repeated, changing the news variable, for each country. The results show that, while for government bond yields of core countries there is no effect of *Grexit* news regardless of the country press, government

[15] It includes Austria, Belgium, Luxembourg, Portugal, Greece, Ireland, Slovenia, Slovakia, Estonia, Malta, Latvia, Lithuania, etc. Given the less frequent use of the term "Grexit" by the Greek press as well as Greek people, we also included Greek news in this more general group of "Other EA".

[16] Equation (1) becomes: $\Delta B_t^i = \alpha^i + \beta^i \Delta B_{t-1}^i + \gamma^i Grexit\ intensity\ by\ country\ press_t + \delta^i ECB\ NSMP_t + \eta^i X_t + \varphi^i W_t^i + \varepsilon_t^i$.

bond yields of peripheral countries still react to increasing *Grexit* news by single country press. This is true not only for news appeared in the domestic country press but also news by other European countries' press. As an example, an increase in the *Grexit intensity* index in the Italian press (namely *Italy* in Table 5) leads to an increases in Italian bond yields (the coefficient is 2.61) as well as in government bond yields of Portugal and Spain (the coefficients are, respectively, 1.91 and 1.66).

[Insert Table 5]

It is interesting that increases in *Grexit* news even from countries press in "Other EA" and countries' press outside the euro area, such as the UK, affect government bond yields in some peripheral Europe only (mostly Italy and Spain), with no impact on core countries. This result is in line with a very fresh analysis by Manasse (Il Sole 24 Ore, 26 June 2016) on how the perception of sovereign risk for European countries in the case of exit of some other country - that is the "Brexit" victory in the UK referendum (23 June 2016) - could change differently depending on single country's situation. Manasse argues that the effects of "Brexit" on credit default swaps five-year spreads would be fairly limited for all countries except Italy, Portugal and Spain, where the risk of default became higher in the case of the "*Leave*" vote compared to a "*Remain*" vote. The common thread of these events (i.e. *Grexit* and *Brexit*) seems to be the wave of increased uncertainty in the financial markets, leading to a flight from the sovereign debt of the weaker countries in the euro area.

4. Additional evidence: *Grexit* news and supranational institutions

Since supranational institutions have normally participated in the debate about *Grexit* and, more importantly, they could be perceived differently by the financial markets, we add an analysis to

focus on the intensity of *Grexit* news combined with international bodies, distinguishing between political and technical authorities. In detail, we consider a subset of news where "Grexit" content is associated with supranational political institutions (i.e. European Council, Council of the European Union, European Parliament) and supranational technical institutions (i.e. EC, ECB, IMF).[17] The idea is to capture the same news content in relation to such different spheres and exploit news heterogeneity along these dimensions.

Operationally, we replace the *Grexit intensity* index in the regressions with this new set of variables that enter equation (1) one at a time.[18] Each index is built by following the same logic explained in Section 2. The results are presented in Table 6, where each table cell represents a single regression repeated for each country (as in Table 5).

[Insert Table 6]

First, it is easy to note that the coefficients on the *Grexit intensity* index related to supranational technical institutions (i.e. below the double line in Table 6) are statistically significant (with a lower level for the coefficient on *European Commission*) and positive across the specifications for government bond yields of peripheral countries (except for Ireland). In contrast, no statistically significant effects emerge for those countries in the case of the European political authorities (i.e. above the double line in Table 6). Overall, this provides support for a different financial markets'

[17] About the EC, it can be considered, at least partially, a technical body – and not a political one, even if the European Commissioners have to be elected by the European Parliament – as it must be independent in the performance of its duties and must not take instruction from national governments. Governments must respect the principle of independence (Article 213 EC). Another classical example of a trusteeship is the delegation of monetary policy to independent central banks to pursue a policy of price stability, as in the case of the ECB (Franchino 2002). Actually, another important actor at the supranational level was the Eurogroup that is the main political forum where confrontation between Greece and its partners has also occurred in 2015. However, we do not include it intentionally in the empirical analysis because the Eurogroup is formally not an institution comparable to the rest of the institutions of our setting. Indeed, it is an informal body composed by the ministers of the euro area member states, who discuss matters relating to their shared responsibilities related to the euro. Moreover, Factiva coverage of *Grexit* news related to the Eurogroup meetings is scarce and such news are likely to be captured by other sources in our database such those related to the domestic and supranational political figures.

[18] Equation (1) becomes: $\Delta B_t^i = \alpha^i + \beta^i \Delta B_{t-1}^i + \gamma^i Grexit\ intensity\ by\ institution_t + \delta^i ECB\ NSMP_t + \eta^i X_t + \varphi^i W_t^i + \varepsilon_t^i$.

reaction to the political *versus* the technical sphere in the case of more vulnerable economies (i.e. Italy, Portugal and Spain).

In detail, even though the ECB position was against the *Grexit* scenario, as demonstrated by the policies implemented in support of both the Euro and the stability of the euro area,[19] an increase in the *Grexit intensity* index associated with such institution has a persistent and positive effect on government bond yields of peripheral countries only, as shown by the coefficients on *ECB* in Table 6. This could be ascribed to the ECB role. Intuitively, when the ECB (or, more specifically, its President Draghi) talks intensively about *Grexit*, the debate becomes more vibrant and financial markets react more visibly to this. One reason might be the ECB statutory constraints and its formal mandate to accomplish specific tasks (e.g., among others, price stability in the euro area for the ECB). This makes such supranational institution more independent of national interests and politics, also in light of its different constituency with respect to political bodies (Ehrmann and Fratzscher, 2011). This contributes, ultimately, to foster credibility-trust mechanisms (for a theoretical viewpoint, see Barro and Gordon 1983; for empirical evidence on Europe, see Ehrmann et al. 2013) according to which financial markets responded more promptly to ECB (and other technical institutions) with respect to the case of European political authorities. The fact that this seems to be happened for more vulnerable economies only in our sample confirms the 'market-based fiscal disciplining' mechanism working in the EMU.

Second, the substantial lack of any statistical significance of the *Grexit intensity* coefficients emerges for core countries, regardless of the supranational institutions considered (i.e. above and below of the double line in Table 6). One exception occurs in the case of the *Grexit intensity* index calculated in the case of the European Parliament, which show negative and statistically significant coefficients across specifications for core countries (see the coefficients on *European Parliament*

[19] The president of the ECB, Draghi, affirmed that "the euro area was better equipped than it had been in the past to deal with a new Greek crisis", but warned of "uncharted waters" if the situation were to deteriorate badly (Financial Times, 18 April 2015). He also pointed out that "a strong and credible agreement with Greece is needed, not only in the interest of Greece, but also of the euro area as a whole" (European Parliament, 15 June 2015). In the same vein, IMF President Lagarde, stated that the IMF "stands ready" for Greece talks (BBC, 27 June 2015).

in Table 6). The intuition behind this result may be that the aim of making Europe and, more precisely, the European Union more stable and consolidated, is one of the main goals of the European Parliament. This possibly might foster a flight-to-quality effect towards such core countries, providing them with greater benefit based on their more solid economies, when the risk of a euro area break-up increased due to more rumours on *Grexit*. Ultimately, this would result in a decrease in their government bond yields.

5. Concluding remarks

This paper has analysed the effects of the potential risk of a euro area break-up, proxied by news on the Greek exit, on European financial markets since the onset of Greek political instability in late 2014. Our empirical analysis produced a number of interesting results. We showed that increased intensity of *Grexit* news contributed to affect other euro area countries' sovereign bond yields. This is consistent with the findings in De Grauwe and Ji (2013, 2014) for the euro area according to which, after years of neglecting high government debt, investors became increasingly worried about its level in the euro zone and reacted by increasing the spreads.

However, this does not occur equally for each country in the sample. Indeed, we found an asymmetric reaction of financial markets to such news: more news on *Grexit* drove up the government bond yields of peripheral countries only – i.e. Italy, Portugal and Spain –, excluding Ireland. In this perspective, our results are close to those by Mink and de Haan (2013) confirming that worrying news about the Greek economic situation – although they are more general than our specific *Grexit* topic – can lead investors to reconsider the valuation of exposure to other countries facing similar problems (Portugal, Ireland and Spain in 2010 for their sample), based on a "learning effect".

Overall, our analysis provides support for the more general view that political news and uncertainty about government policy can have an adverse effect on countries' financial stability

(Pastor and Veronesi, 2012, 2013; Kelly et al. 2016) and economic outcomes (Baker et al. 2016). We contribute to this field of literature by showing that policy uncertainty, like that related to *Grexit* news questioning the euro area's future, adversely affected financial markets by increasing risk premia especially of more scrutinized economies (i.e. Southern euro area countries), in light of their worse fiscal position and vulnerability during that period.

References

Aizenman, J., Hutchinson, M., & Jinjar, Y. (2013). What is the risk of European sovereign debt defaults? Fiscal space, CDS spreads and market pricing of risk. *Journal of International Money and Finance* 34, 37–59.

Alessandrini, P., Fratianni, M., Hallett, A. H., & Presbitero, A. F. (2014). External imbalances and fiscal fragility in the euro area. *Open Economies Review* 25(1), 3-34.

Alexopoulos, M., & Cohen, J. (2015). The power of print: Uncertainty shocks, markets, and the economy. *International Review of Economics & Finance* 40, 8-28.

Altavilla, C., Giannone, D., & Modugno, M. (2014). The Low Frequency Effects of Macroeconomic News on Government Bond Yields (No. 2014-52). Board of Governors of the Federal Reserve System, United States.

Arghyrou, M. G. and Kontonikas, A. (2012). The EMU sovereign-debt crisis: Fundamentals, expectations and contagion. *Journal of International Financial Markets, Institutions and Money* 22(4), 658-677.

Arru, D., Iacovoni, D., Monteforte, L. & Pericoli, F.M. (2013). EMU sovereign spreads and macroeconomic news. *Public Debt, Global Governance and Economic Dynamism*, 343–363.

Baig, T., & Goldfajn, I. (1999). Financial market contagion in the Asian crisis. *International Monetary Fund Staff Papers* 46(2), 167–195.

Baker, S. R., Bloom, N., & Davis, S. J. (2016). Measuring economic policy uncertainty, *Quarterly Journal of Economics*, forthcoming.

Barro, R., & Gordon, D. (1983). Rules, discretion and reputation in a model of monetary policy, *Journal of Monetary Economics* 12, 101–121.

Bayoumi, T., Goldstein, M., & Woglom, G. (1995). Do credit markets discipline sovereign borrowers? Evidence from U.S. states. *Journal of Money, Credit and Banking* 27(4), 1046-1059.

Beetsma, R., Giuliodori, M., de Jong, F., & Widijanto, D. (2013). Spread the news: The impact of news on the European sovereign bond markets during the crisis. *Journal of International Money and Finance* 34, 83-101.

Bhanot, K., Burns, N., Hunter, D., & Williams, M. (2014). News spillovers from the Greek debt crisis: Impact on the Eurozone financial sector. *Journal of Banking & Finance* 38, 51-63.

Bollerslev, T. (1986). Generalized autoregressive conditional heteroskedasticity. *Journal of Econometrics* 31(3), 307–327.

Born, B., Ehrmann, M., & Fratzscher, M. (2014). Central bank communication on financial stability. *The Economic Journal* 124(577), 701-734.

Boudoukh, J., Feldman, R., Kogan, S., and Richardson, M. (2013). Which News Moves Stock Prices? A Textual Analysis. NBER Working Paper 18725.

Bouzgarrou, H., & Chebbi, T. (2015). Does news on the euro area impact the sovereign yield spreads?. *International Journal of Monetary Economics and Finance* 8(1), 4-19.

Box, G. E., & Pierce, D. A. (1970). Distribution of residual autocorrelations in autoregressive-integrated moving average time series models. *Journal of the American statistical Association* 65(332), 1509-1526.

Buiter, W., & Rahbari, E. (2012). Rising Risks of Greek Euro Area Exit. *Global Economics View*.

Caporale, G.M., Spagnolo, F. & Spagnolo, N. (2014). Macro News and Bond Yield Spreads in the Euro Area, DIW Berlin Working Paper, No. 1413.

Codogno, L., Favero, C., Missale, A., Portes, R. & Thum, M. (2003). Yield Spreads on EMU Government Bonds, *Economic Policy* 18(37), 503-532.

Coudert, V., & Gex, M. (2008). Does risk aversion drive financial crises? Testing the predictive power of empirical indicators. *Journal of Empirical Finance* 15(2), 167-184.

De Grauwe, P. (2013). The European Central Bank as lender of last resort in the government bond markets. *CESifo Economic Studies* 59(3), 520-535.

De Grauwe, P., & Ji, Y. (2013). Self-fulfilling crises in the Eurozone: An empirical test. *Journal of International Money and Finance* 34, 15-36.

De Grauwe, P., & Ji, Y. (2014). How much fiscal discipline in a monetary union?. *Journal of Macroeconomics* 39, 348-360.

Demertzis, M. & Wolff, G. B. (2016). The effectiveness of the European Central Bank's asset Purchase programme. Bruegel Policy Contribution 2016/10. Brussels: Bruegel.

Dräger, L., Lamla, M. J., & Pfajfar, D. (2016). Are survey expectations theory-consistent? The role of central bank communication and news. *European Economic Review* 85, 84-111.

Dunne, P. G., Moore, J. & Porter, R. (2002). Defining Benchmark Status. An Application Using Euro-Area Bonds. National Bureau of Economic Research Working Paper, No 9087.

Ehrmann, M., & Fratzscher, M. (2011). Politics and Monetary Policy. *Review of Economics and Statistics* 93, 941–960.

Ehrmann, M., Soudan, M., & Stracca, L. (2013). Explaining European Union citizens' trust in the European Central Bank in normal and crisis times. *The Scandinavian Journal of Economics* 115(3), 781-807.

Engelberg, J., & Parsons, C. A. (2011). The causal impact of media in financial markets. *Journal of Finance* 66, 67–97.

Engle, R. F. (1982). Autoregressive conditional heteroscedasticity with estimates of the variance of

United Kingdom inflation. *Econometrica* 50, 987-1007.

European Parliament (2016). Effectiveness of the ECB programme of asset purchases: Where do we stand? Monetary Dialogue 21 June 2016, Policy Department A: Economic and Scientific Policy. Economic and Monetary Affairs.

Falagiarda, M., & Gregori, W. D. (2015). The impact of fiscal policy announcements by the Italian government on the sovereign spread: A comparative analysis. *European Journal of Political Economy* 39, 288-304.

Falagiarda, M., McQuade, P., & Tirpák M. (2015). Spillovers from the ECB's non-standard monetary policies on non-euro area EU countries: evidence from an event-study analysis. ECB working paper 1869.

Falagiarda, M., & Reitz, S. (2015). Announcements of ECB unconventional programs: Implications for the sovereign spreads of stressed euro area countries. *Journal of International Money and Finance* 53, 276-295.

Favero, C., Pagano, M., & von Thadden, E.L. (2010). How does liquidity affect government bond yields? *Journal of Financial and Quantitative Analysis* 45(1), 107–134.

Favero, C., & Missale, A. (2012). Sovereign spreads in the eurozone: which prospects for a eurobond? *Economic Policy* 27, 231–273.

Foerster, A. T. (2014). The asymmetric effects of uncertainty. *Economic Review* Q III, 5-26.

Franchino, F. (2002). Efficiency or credibility? Testing the two logics of delegation to the European Commission. *Journal of European Public Policy* 9(5), 677-694.

Gade, T., Salines, M., Glöckler, G., & Strodthoff, S. (2013). "Loose lips sinking markets?": the impact of political communication on sovereign bond spreads. ECB Occasional Paper Series 150. European Central Bank, Frankfurt am Main.

Garcia Pascual, A., & Wieladek, T. (2016). The European Central Bank's QE: A New Hope. CESifo working paper 5946.

Glick, R., & Leduc, S. (2012). Central bank announcements of asset purchases and the impact on global financial and commodity markets. *Journal of International Money and Finance* 31(8), 2078-2101.

Goldstein, M., & Woglom, G. (1991). *Market-based Fiscal Discipline in Monetary Unions: Evidence from the US Municipal Bond Market*, International Monetary Fund.

Hamilton, J. D. (1994). *Time Series Analysis*. Princeton University Press.

Hamilton, J. D., & Wu, J. C. (2012). The effectiveness of alternative monetary policy tools in a zero lower bound environment. *Journal of Money, Credit and Banking* 44(s1), 3-46.

Hansen, P. R., & Lunde, A. (2005). A forecast comparison of volatility models: does anything beat

a GARCH (1, 1)? *Journal of Applied Econometrics*, 20(7), 873-889.

Haupenthal, A., & Neuenkirch, M. (2017). Grexit news and stock returns. *Applied Economics* 49(39), 3891-3898.

Hayo, B., & Neuenkirch, M. (2015). Self-monitoring or reliance on media reporting: How do financial market participants process central bank news?. *Journal of Banking & Finance* 59, 27-37.

Kaminsky, G.L., & Schmukler, S.L. (1999). What triggers market jitters: a chronology of the Asian crisis. *Journal of International Money and Finance* 18, 537–560

Kelly, B., Pastor, L., & Veronesi, P. (2016), The price of political uncertainty: Theory and evidence from the option market. *Journal of Finance*, forthcoming.

Kim, S. J., McKenzie, M. D., & Faff, R. W. (2004). Macroeconomic news announcements and the role of expectations: evidence for US bond, stock and foreign exchange markets. *Journal of Multinational Financial Management* 14(3), 217-232.

Klibanoff, P., Lamont, O., & Wizman, T. A. (1998). Investor reaction to salient news in closed-end country funds. *Journal of Finance* 53, 673–699.

Majone, G. (2001). Two logics of delegation: agency and fiduciary relations in EU governance. *European Union Politics* 2(1), 103–122.

Mink, M., & De Haan, J. (2013). Contagion during the Greek sovereign debt crisis. *Journal of International Money and Finance* 34, 102-113.

Mohl, P., & Sondermann, D. (2013). Has political communication during the crisis impacted sovereign bond spreads in the euro area?. *Applied Economics Letters* 20(1), 48-61.

Panizza, U., & Wyplosz, C. (2016). The Folk Theorem of Decreasing Effectiveness of Monetary Policy: What Do the Data Say? Paper presented at the Annual Research Conference of the IMF on November 3-4, 2016.

Pastor, L., & Veronesi, P. (2012). Uncertainty about government policy and stock prices. *Journal of Finance* 67, 1219-1264.

Pastor, L., & Veronesi, P. (2013). Political uncertainty and risk premia. *Journal of Financial Economics* 110, 520-545.

Peress, J. (2014). The Media and the Diffusion of Information in Financial Markets: Evidence from Newspaper Strikes. *Journal of Finance* 69(5), 2007-2043.

Saka, O., Fuertes, A. M., & Kalotychou, E. (2015). ECB policy and Eurozone fragility: Was De Grauwe right?. *Journal of International Money and Finance* 54, 168-185.

Schuknecht, L., Von Hagen, J., & Wolswijk, G. (2009). Government risk premiums in the bond market: EMU and Canada. *European Journal of Political Economy* 25(3), 371-384.

Szczerbowicz, U. (2015). The ECB unconventional monetary policies: have they lowered market borrowing costs for banks and governments?. *International Journal of Central Banking* 11(4), 91-127.

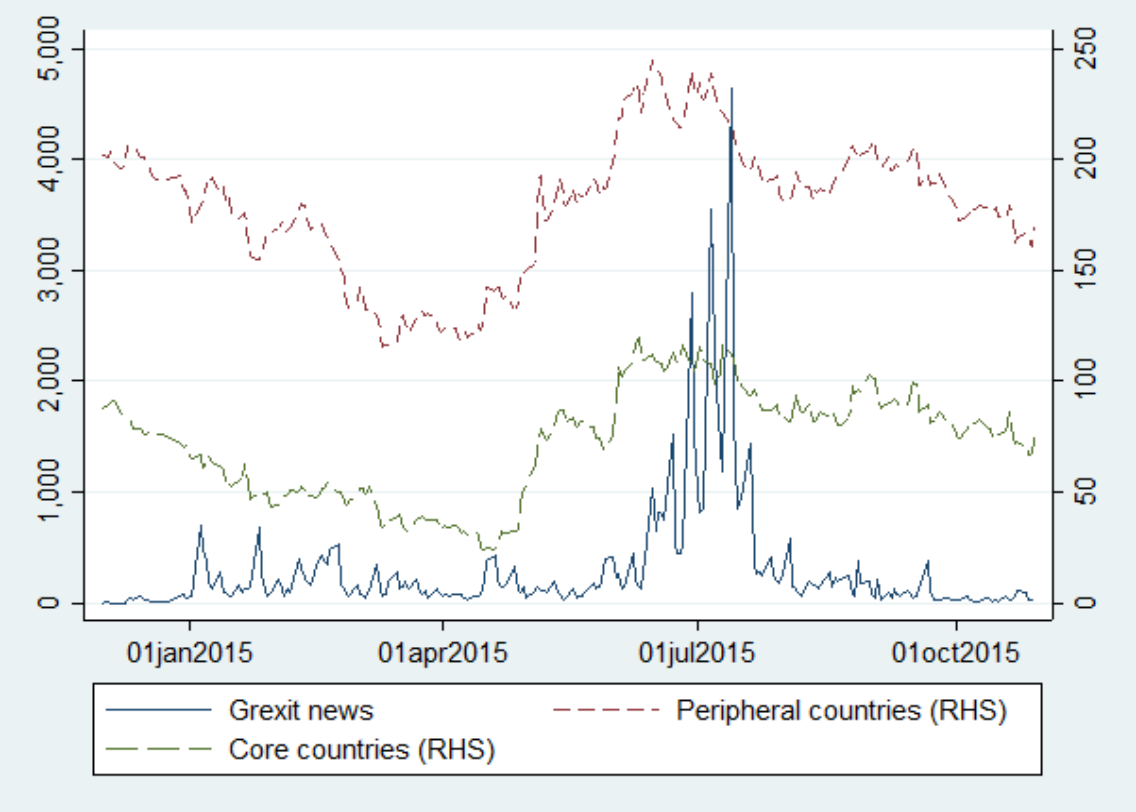
Tetlock, P. C. (2007). Giving content to investor sentiment: The role of media in the stock market. *Journal of Finance* 62, 1139–1168.

von Hagen, J., Schuknecht, L., & Wolswijk, G. (2011). Government bond risk premiums in the EU revised: the impact of the financial crisis. *European Journal of Political Economy* 27, 36–43.

Whelan, K. (2014). Ireland's economic crisis: The good, the bad and the ugly. *Journal of Macroeconomics* 39, 424-440.

Figures

Figure 1 - *Daily number of Grexit news worldwide (left axis) and 10-year government bond yields (right axis) of peripheral and core countries (group average basis points).*



Notes: Belgium, France, Finland, Germany, and the Netherlands are grouped in the core countries. Ireland, Italy, Portugal and Spain are included in the peripheral countries. Period: December 1, 2014 - October 31, 2015.
Source: Own elaborations on Factiva and Thomson Reuters Datastream databases.

Tables

Table 1 - Variables definition, source and summary statistics.

Variables	Definition	Mean	Std. Dev.	Min.	Max.
Dependent variables					
10-year government bond yields*	End-of-day 10-years government bond yields (used in Δ)				
Peripheral countries					
Ireland		1.21	0.27	0.66	1.78
Italy		1.76	0.30	1.14	2.41
Portugal		2.44	0.39	1.55	3.26
Spain		1.76	0.32	1.15	2.42
Core countries					
Belgium		0.85	0.26	0.34	1.33
Finland		0.69	0.25	0.19	1.16
France		0.84	0.25	0.35	1.32
Germany		0.54	0.21	0.07	0.98
Netherlands		0.69	0.26	0.22	1.20
Explanatory variables					
*Grexit intensity***	Number of daily news (used in Δ) containing the word "Grexit" from all over the world	274.73	517.47	0	4,648
Country press**	*Grexit intensity* by a single country press:				
France		22.98	55.24	0	562
Germany		66.22	113.98	0	957
Spain		19.23	46.09	0	461
Italy		28.10	61.17	0	626

United Kingdom		13.60	24.80	0	188
Other EA		27.98	55.76	0	530
Institutions**	*Grexit intensity* associated with:				
European Council		0.75	3.18	0	35
Council of the EU		0.96	4.03	0	56
European Parliament		2.91	11.39	0	114
European Commission		4.96	12.53	0	140
ECB		16.72	35.36	0	320
IMF		17.53	32.29	0	185
Common control variables					
*EuroVix**	European volatility index (VSTOXX), used in daily basis point changes	23.99	4.67	16.33	40.80
*Risk Aversion**	Difference between US AAA corporate bond yields and US 10-year government bond yields (used in daily basis point changes)	0.66	0.09	0.51	0.90
*ECB NSMP****	Dummy equal to 1 for ECB non-standard monetary policy announcements	0.04	0.19	0	1

Notes: Summary statistics are calculated for variables expressed in levels over the whole period. Information for additional country-specific control variables (i.e. W_t^i) are not reported in the table for the sake of space. Sources: Elaborations on * Datastream; ** Factiva; *** Falagiarda et al. (2015).

Table 2 – *Grexit* news and government bond yields.

Δ(10-year Government bond yields)									
	Peripheral countries				*Core countries*				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Ireland	Italy	Portugal	Spain	Belgium	Finland	France	Germany	Netherlands
yield (t-1)	0.15*	-0.06	0.08	-0.07	-0.04	-0.00	-0.07	-0.07	-0.05
	(0.09)	(0.06)	(0.06)	(0.06)	(0.07)	(0.08)	(0.07)	(0.07)	(0.07)
Grexit intensity	0.06	0.26***	0.22**	0.24***	0.02	-0.08	0.03	-0.07	-0.06
	(0.05)	(0.07)	(0.11)	(0.07)	(0.07)	(0.11)	(0.07)	(0.09)	(0.06)
EuroVix	0.02	0.18***	0.30***	0.20***	-0.05*	-0.09***	-0.07**	-0.13***	-0.09***
	(0.03)	(0.04)	(0.06)	(0.05)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Risk Aversion	-0.01	0.13	0.17	0.11	-0.19	-0.23	-0.12	-0.19	-0.29
	(0.19)	(0.26)	(0.33)	(0.28)	(0.18)	(0.22)	(0.19)	(0.14)	(0.18)
ECB NSMP	-1.96	-3.27**	-3.80*	-2.84*	-3.03***	-2.65**	-3.27***	-2.64**	-4.70***
	(1.32)	(1.38)	(1.97)	(1.72)	(1.12)	(1.11)	(1.14)	(1.06)	(1.38)
Observations	234	234	234	234	234	234	234	234	234
Log likelihood	-663.75	-725.13	-794.73	-748.19	-662.92	-661.15	-677.6	-655.21	-668.16
Q(10)	0.39	0.28	0.54	0.24	0.15	0.27	0.35	0.66	0.19

Notes: GARCH(1,1) regressions of daily basis point changes in the sovereign bond yields on full sample period (1 December 2014–31 October 2015). Each column represents a country regression. *Grexit intensity* and *yiled(t-1)* variables are expressed in Δ as described in Section 2. Coefficients on *Grexit intensity* are rescaled and multiplied by 100. Q(10) indicates the statistical significance of the Ljung–Box Q test for the autocorrelations of the standardized residuals up to the 10th orders. *** (**, *) indicates statistical significance at 1% (5%, 10%) respectively.

Table 3 – *Grexit* news and government bond yields, Pre- and Post-referendum

Δ(10-year Government bond yields)									
	Peripheral countries				*Core countries*				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Ireland	Italy	Portugal	Spain	Belgium	Finland	France	Germany	Netherlands
yield (t-1)	0.15**	-0.03	0.09	-0.07	-0.04	-0.03	-0.07	-0.06	-0.05
	(0.07)	(0.06)	(0.06)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Grexit intensity PRE	0.16	0.70***	0.95***	0.56***	0.12	-0.05	0.11	0.04	0.03
	(0.11)	(0.12)	(0.16)	(0.17)	(0.11)	(0.17)	(0.11)	(0.17)	(0.10)
Grexit intensity POST	-0.03	0.15	0.14	0.12	-0.02	-0.12	-0.01	-0.09	-0.10
	(0.07)	(0.09)	(0.12)	(0.09)	(0.11)	(0.09)	(0.10)	(0.12)	(0.09)
EuroVix	0.12	0.17***	0.27***	0.19***	-0.05*	-0.09***	-0.08**	-0.13***	-0.09***
	(0.03)	(0.04)	(0.07)	(0.05)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Risk Aversion	-0.09	0.08	0.14	0.05	-0.21	-0.24	-0.12	-0.18	-0.29
	(0.16)	(0.27)	-0.37	-0.27	(0.17)	(0.18)	(0.19)	(0.14)	(0.19)
ECB NSMP	-1.78*	-3.12**	-3.80*	-2.80	-3.08***	-4.26***	-3.30***	-2.72**	-4.80***
	(1.02)	(1.40)	(1.98)	(1.74)	(1.12)	(1.10)	(1.14)	(1.07)	(1.38)
Observations	234	234	234	234	234	234	234	234	234
Log likelihood	-663.09	-726.89	-793.70	-744.70	-669.14	-663.26	-677.42	-655.07	-667.91
Q(10)	0.47	0.10	0.22	0.11	0.44	0.47	0.51	0.81	0.29

Notes: GARCH(1,1) regressions of daily basis point changes in the sovereign bond yields on full sample period (1 December 2014–31 October 2015). Each column represents a country regression. The two *Grexit intensity* indexes and *yiled(t-1)* are expressed in Δ. Coefficients on *Grexit intensity PRE* and *Grexit intensity POST* are rescaled and multiplied by 100. Q(10) indicates the statistical significance of the Ljung–Box Q test for the autocorrelations of the standardized residuals up to the 10th orders. *** (**, *) indicates statistical significance at 1% (5%, 10%) respectively.

Table 4 – *Grexit* news and government bond yields, Positive and negative variations.

Δ(10-year Government bond yields)									
	Peripheral countries				*Core countries*				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Ireland	Italy	Portugal	Spain	Belgium	Finland	France	Germany	Netherlands
yield (t-1)	0.14**	-0.05	0.09	-0.07	-0.05	-0.03	-0.07	-0.07	-0.02
	(0.07)	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)	(0.06)	(0.08)
Grexit intensity POS	0.09	0.40***	0.35***	0.48***	-0.03	-0.17	-0.03	-0.14	-0.16
	(0.07)	(0.08)	(0.10)	(0.09)	(0.11)	(0.20)	(0.13)	(0.18)	(0.13)
Grexit intensity NEG	-0.02	-0.18	-0.13	-0.06	-0.08	0.01	-0.10	-0.01	-0.10
	(0.12)	(0.16)	(0.27)	(0.19)	(0.12)	(0.13)	(0.12)	(0.16)	(0.12)
EuroVix	0.02	0.18***	0.29***	0.20***	-0.05*	-0.08**	-0.07**	-0.13***	-0.10***
	(0.03)	(0.04)	(0.06)	(0.05)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Risk Aversion	-0.08	0.14	0.17	0.12	-0.19	-0.24	-0.12	-0.19	-0.33*
	(0.15)	(0.26)	(0.35)	(0.27)	(0.18)	(0.18)	(0.19)	(0.14)	(0.20)
ECB NSMP	-1.79*	-3.20**	-3.69*	-2.61	-3.09***	-4.40***	-3.29***	-2.66	-4.76
	(1.03)	(1.39)	(1.98)	(1.70)	(1.12)	(1.09)	(1.15)	(1.06)	(1.38)
Observations	234	234	234	234	234	234	234	234	234
Log likelihood	-663.68	-728.99	-795.42	-744.93	-668.20	-662.94	-667.33	-654.87	-668.54
Q(10)	0.43	0.21	0.44	0.23	0.32	0.59	0.32	0.64	0.38

Notes: GARCH(1,1) regressions of daily basis point changes in the sovereign bond yields on full sample period (1 December 2014–31 October 2015). Each column represents a country regression. The two *Grexit intensity* indexes and *yiled(t-1)* are expressed in Δ. Coefficients on *Grexit intensity POS* and *Grexit intensity NEG* are rescaled and multiplied by 100. Q(10) indicates the statistical significance of the Ljung–Box Q test for the autocorrelations of the standardized residuals up to the 10th orders. *** (**, *) indicates statistical significance at 1% (5%, 10%) respectively.

Table 5 – *Grexit* news by country press and government bond yields.

Δ(10-year Government bond yields)									
	Peripheral countries				*Core countries*				
	Ireland	Italy	Portugal	Spain	Belgium	Finland	France	Germany	Netherlands
Grexit intensity index by country press:									
France	-0.05	1.48**	1.16	1.14*	-0.04	-0.81	0.11	-0.87	-0.69
	(0.50)	(0.68)	(1.18)	(0.68)	(0.69)	(0.80)	(0.64)	(0.78)	(0.56)
Germany	0.35	0.92***	0.84	0.83**	0.08	-0.41	0.18	-0.29	-0.22
	(0.25)	(0.35)	(0.53)	(0.34)	(0.31)	(0.49)	(0.30)	(0.38)	(0.28)
Spain	0.19	1.18	0.99	1.07	-0.26	-1.28	-0.25	-1.12	-1.03
	(0.55)	(0.98)	(1.46)	(0.92)	(0.84)	(0.96)	(0.83)	(0.95)	(0.74)
Italy	0.59	2.61***	1.91**	1.66***	0.35	-0.35	0.45	0.02	-0.15
	(0.43)	(0.51)	(0.82)	(0.53)	(0.64)	(0.93)	(0.62)	(0.71)	(0.57)
United Kingdom	1.23	3.73**	1.45	1.30	1.98	-0.10	0.64	-0.08	0.02
	(1.18)	(1.69)	(2.59)	(1.31)	(1.50)	(1.61)	(1.37)	(1.40)	(1.17)
Other EA	0.48	1.87***	1.43	1.50**	0.23	-0.58	0.28	-0.34	-0.40
	(0.47)	(0.64)	(1.07)	(0.65)	(0.65)	(0.90)	(0.64)	(0.79)	(0.57)
Controls of equation (1)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	234	234	234	234	234	234	234	234	234

Notes: GARCH(1,1) regressions of daily basis point changes in the sovereign bond yields on full sample period (1 December 2014–31 October 2015). Each table cell represents a country regression. *Grexit intensity* indexes (e.g., *France, Germany,* etc.) are used one at a time and expressed in Δ. Their coefficients are rescaled and multiplied by 100. Controls and the lagged dependent variable are included in the estimations but not reported in the table for each regression. *** (**, *) indicates statistical significance at 1% (5%, 10%) respectively.

Table 6 – *Grexit* news by institutions and government bond yields.

Δ(10-year Government bond yields)									
	Peripheral countries				*Core countries*				
	Ireland	Italy	Portugal	Spain	Belgium	Finland	France	Germany	Netherlands
Grexit intensity index by institution:									
European Council	-16.13*	3.26	5.59	-1.28	-8.19	-6.11	-3.23	5.61	-9.63
	(8.58)	(16.91)	(22.62)	(21.32)	(11.23)	(11.18)	(11.08)	(11.63)	(10.07)
Council of the EU	-0.67	6.46	7.10	3.44	-2.68	-5.26	0.37	-7.78	-5.43
	(5.26)	(12.18)	(16.61)	(17.14)	(7.62)	(8.50)	(7.26)	(9.64)	(6.98)
European Parliament	-5.52	4.73	6.75	6.44	-9.65***	-9.88***	-9.37***	-12.81***	-11.97***
	(3.64)	(5.52)	(7.10)	(5.09)	(2.34)	(3.32)	(2.85)	(3.05)	(2.68)
European Commission	0.09	3.56	6.12	5.20*	-2.04	0.04	-2.11	-0.88	-3.73*
	(2.09)	(2.82)	(4.28)	(2.72)	(1.97)	(2.58)	(2.13)	(1.78)	(1.91)
ECB	1.27	5.66***	8.38***	5.15***	0.76	-0.58	0.58	0.07	-0.03
	(0.95)	(0.98)	(1.35)	(1.70)	(0.79)	(1.52)	(0.76)	(0.69)	(0.68)
IMF	1.16	3.68***	3.97*	3.40**	-0.13	-1.24	0.36	0.64	-3.13***
	(1.14)	(1.42)	(2.34)	(1.59)	(1.04)	(1.56)	(1.02)	(1.03)	(1.19)
Controls in equation (1)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	234	234	234	234	234	234	234	234	234

Notes: GARCH(1,1) regressions of daily basis point changes in the sovereign bond yields on full sample period (1 December 2014–31 October 2015). Each table cell represents a country regression. *Grexit intensity* indexes (e.g., *European Council*, *Council of the EU, European Parliament,* etc.) are used one at a time and expressed in Δ. Their coefficients are rescaled and multiplied by 100. Control variables and the lagged dependent variable are included in the estimations but not reported in the table for each regression. *** (**, *) indicates statistical significance at 1% (5%, 10%) respectively.

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